



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/765,309

01/27/2004

Junji Nishii

10873.1394US01

9395

52835 7590 05/15/2007
HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
P.O. BOX 2902
MINNEAPOLIS, MN 55402-0902

EXAMINER

STAHL, MICHAEL J

ART UNIT

PAPER NUMBER

2874

MAIL DATE

DELIVERY MODE

05/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/765,309	Applicant(s) NISHII ET AL.	
	Examiner Mike Stahl	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 22-26 is/are rejected.
- 7) ☒ Claim(s) 15-21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08).
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 6, 2007 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-6, 11-14, and 22-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Kosaka et al. (US 6188819).

Claim 1: Kosaka discloses an optical element (fig. 1) comprising a structure (within layer 1) having at least one convex portion and at least one concave portion 5 formed so as to be adjacent to one of the convex portions, at least one surface of the structure being covered, the optical element having a hollow portion (air within 5), wherein an aspect ratio of the concave portion is set to be 2 or more (example given is at least 2.6 – col. 7 lns. 37-38), wherein the at least one surface of the structure is covered with a covering layer 2, wherein the height of the hollow portion is the same as the depth of the concave portion. “[F]ormed by a deposition

Art Unit: 2874

process” is a product-by-process limitation (MPEP 2113) and so is not given weight because it does not define a structural difference in this instance.

Claim 2: The optical element further comprises a substrate 3, wherein the structure is placed on the substrate.

Claim 4: At least one of the convex portion and the concave portion is disposed so as to have a periodic structure.

Claim 5: At least one of the convex portion and the concave portion is disposed so as to have a one-dimensional periodic structure. Any row or column of 5s is a one-dimensional periodic structure.

Claim 6: At least one of the convex portion and the concave portion is disposed so as to have a two-dimensional periodic structure.

Claim 11: The optical component is an optical waveguide (col. 2 lns. 20-23; col. 3 lns. 58-63; col. 5 ln. 67 – col. 6 ln. 31; etc.).

Claim 12: The convex portion and the concave portion are arranged periodically in an alternate manner, and a depth of the concave portion is larger than half the width of the concave portion (example aspect ratio is 2.6 – col. 4 lns. 21-23). The arrangement period in the example is 0.83 microns (col. 4 lns. 25-26), and the operating wavelength is about 1.5 microns (figs. 6-10). So the arrangement period is about 0.55 times the wavelength of light to be used and is within the recited range.

Claim 13: The depth of the concave portion may be more than twice the width of the concave portion (the example lists 2.6).

Art Unit: 2874

Claim 14: The Kosaka device has the recited structure (1 is a core layer, 2 and 3 are cladding layers, the core layer having the highest refractive index as discussed at cols. 5-7).

Claims 22-26: The process for fabricating the Kosaka device described above meets the limitations of these claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5, 7-8, 10-14, and 22-25 are rejected under 35 U.S.C. 102(b) as anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over Fournier et al. (US 5210801).

Claim 1: Fournier discloses an optical element (fig. 2) comprising a structure having at least one convex portion and at least one concave portion formed so as to be adjacent to one of

Art Unit: 2874

the convex portions, at least one surface of the structure being covered, the optical element having a hollow portion 26, wherein an aspect ratio of the concave portion is set to be 2 or more (col. 6 lns. 39-42; clm 5), wherein the at least one surface of the structure is covered with a covering layer 24. “[F]ormed by a deposition process” is a product-by-process limitation (MPEP 2113) and so is not given weight because it does not define a structural difference in this instance. The limitation that the height of the hollow portion is the same as the depth of the concave portion is not specifically described in the reference but is believed to be inherent in the reference structure because the hollow portion 26 would necessarily take up whatever space is available (bound by the bottom and sides of the groove, and by the layer 24). MPEP 2112(III) permits a hybrid 102/103 rejection in this situation. In the event that this limitation is not inherent in the reference, it would have been obvious to a skilled person to make the height of the hollow portion equal the depth of the concave portion so as to maximize the cross section of the air bubble available for interaction with the light beam (as opposed to having bubbles which are much smaller than the available depth). It is further asserted that the top of the hollow portion 26 should extend up to the top of layer 18 since 18 is the guide layer in which most of the light is confined.

Claim 2: The optical element further comprises a substrate 14, wherein the structure is placed on the substrate.

Claim 3: The optical element further comprises a substrate 14 and a solid layer 16 stacked on the substrate, wherein the structure is placed on the solid layer.

Claim 4: In an extended embodiment (fig. 10), at least one of the convex portion and the concave portion is disposed so as to have a periodic structure.

Claim 5: At least one of the convex portion and the concave portion is disposed so as to have a one-dimensional periodic structure.

Claim 7: The fig. 3A embodiment has a convex portion with a multi-layered structure (i.e., it includes layers 16 and 18).

Claim 8: The number of convex portions is one, and a plurality of concave portions are formed.

Claim 10: In the related fig. 8 embodiment, an optical component for controlling light is placed on the structure.

Claim 11: The optical component is an optical waveguide.

Claim 12: The convex portion and the concave portion are arranged periodically in an alternate manner, and a depth of the concave portion is larger than half the width of the concave portion (col. 13 lns. 9-14). Fournier also teaches a range of values for the arrangement period of 0.3 to 3 microns (col. 13 lns. 15-20). A nominal operating wavelength of 800 nm is mentioned several times in the reference. Thus the disclosed grating period range corresponds to 0.375 to 3.75 times the operating wavelength and is entirely within the range recited by claim 12.

Claim 13: The depth of the concave portion may be more than twice the width of the concave portion (col. 6 lns. 39-42; claim 5).

Claim 14: As shown in fig. 2, the structure includes an upper cladding layer 24, a lower cladding layer 16, and a core layer 18 having a refractive index higher than those of the upper cladding layer and the lower cladding layer, wherein the core layer is interposed between the upper cladding layer and the lower cladding layer, and the structure is placed in the core layer.

Art Unit: 2874

Claims 22-26: The process for fabricating the fig. 2 device meets the limitations of these claims.

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fournier et al. (cited above).

Claim 6: Fournier does not disclose a two-dimensionally periodic structure. Official notice is taken of the fact that two-dimensionally periodic structures are well known in the art. In particular, the prior art includes many instances of photonic crystals defined by a two-dimensionally periodic array of air holes within a solid layer. The benefits of Fournier's covering process with respect to one-dimensional arrays of air holes (see e.g. col. 2 lns. 10-28 and col. 3 lns. 12-17 and 26-36) are clearly applicable to two-dimensional arrays as well. Thus it would have been obvious to a skilled person to have applied Fournier's teachings to a conventional two-dimensionally periodic air hole structure in order to achieve these benefits.

Claim 9: Fournier does not teach stacking a plurality of the optical elements according to claim 1. It would have been obvious to a skilled person to have stacked a number of the Fournier elements in order to conserve space on a supporting substrate.

Allowable Subject Matter

Claims 15-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Allowable aspects of these claims were noted in a previous Office action. Consideration of the newly applied Kosaka reference does not alter that determination.

Art Unit: 2874

Conclusion

Inquiries about this letter may be directed to examiner Stahl at the number below.

Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official correspondence which is eligible for submission by facsimile and which pertains to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions about the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Stahl MSS
2874
571-272-2360

May 10, 2007


Rodney Bovernick
Supervisory Patent Examiner
Technology Center 2800